We Claim:

1. A system for neuromuscular function reeducation and restoring physical function of an at least one neuromuscular system associated with an at least one joint in a patient, the system comprising:

at least one sensor for measuring a signal indicative of a force associated with the antagonist resisting muscle system in the neuromuscular system of the patient;

wherein the signal from the antagonist resisting muscle system is used to provide sensory feedback for affecting the joint extension and flexion, through the patient's cognitive action, thereby enabling reeducation and restoration of the physical function of the at least one neuromuscular system.

2. The system according to claim 1, wherein the at least one sensor for measuring a signal indicative of a force associated with the antagonist resisting muscle system is a force sensitive resistor (FSR).

3. The system according to claim 1, wherein the sensory feedback includes at least one of tactile sensing, audio signal, and light from a source.

4. The system according to claim 1, wherein the antagonist resisting muscle system is the flexor muscle system.

5. The system according to claim 1, wherein the signal indicative of the force associated with the antagonist resisting muscle system is related to the magnitude of resistance offered by said antagonist resisting muscle system.

6. The system according to claim 5, further including a joint position sensor for measuring the joint displacement.

7. The system according to claim 6, wherein the magnitude of the resistance is computed by dividing the force obtained from the force sensing system by the displacement as measured by the joint position sensor.

8. A system for neuromuscular function reeducation and restoring physical function of an at least one neuromuscular system associated with an at least one joint in a patient, the system comprising:

at least one sensor for measuring an electrical signal associated with an agonist muscle in the neuromuscular system of the patient;

at least one sensor for measuring a force signal associated with an antagonist resisting muscle;

wherein at least one of the electrical signal associated with the agonist muscle and the force signal associated with the antagonist resisting muscle is used to provide sensory feedback for affecting the joint extension and flexion thereby enabling reeducation and restoration of the physical function of the at least one neuromuscular system.

9. The system according to claim 8, wherein the sensory feedback is provided through an audio signal.

10. The system according to claim 8, wherein the at least one sensor for measuring an electrical signal associated with the agonist muscle is an EMG sensor.

11. The system according to claim 8, wherein the antagonist resisting muscle is the flexor muscle.

12. A system for neuromuscular function reeducation and restoring physical function of an at least one neuromuscular system associated with an at least one joint in a patient, the system comprising:

at least one sensor for measuring an electrical signal associated with an agonist muscle in the neuromuscular system of the patient;

at least one sensor for measuring a force signal associated with an antagonist resisting muscle;

at least one electrode for providing a neuromuscular stimulation to the at least one neuromuscular system;

wherein at least one of the electrical signal associated with the agonist muscle and the electrical signal associated with the antagonist resisting muscle is used to provide sensory feedback, the sensory feedback and the neuromuscular stimulation affecting the joint extension and flexion thereby enabling reeducation and restoration of the physical function of the at least one neuromuscular system.

13. The system according to claim 12, wherein the sensory feedback is provided by at least one LED.

14. The system according to claim 12, wherein the at least one sensor for measuring an electrical signal associated with the agonist muscle is an EMG sensor.

15. The system according to claim 12, wherein the antagonist resisting muscle is the flexor muscle.

16. A system for neuromuscular function reeducation and restoring physical function of an at least one neuromuscular system associated with an at least one joint in a patient, the system comprising:

a continuous passive device for allowing the extension and flexion of the joint, said continuous passive device having a mechanical compliance which allows self-actuation of the joint thereby providing neuromuscular function reeducation and restoration of the physical function of the neuromuscular system.

17. The system according to claim 16, wherein the continuous passive device is force activated.

18. The system according to claim 16, wherein the mechanical compliance of the continuous passive device is substantially large.

19. The system according to claim 16, further comprising at least one force sensor for measuring a parameter indicative of resistance of an antagonist resisting muscle, the antagonist resisting muscle being part of the neuromuscular system.

20. The system according to claim 19, wherein the parameter indicative of the resistance of the antagonist resisting muscle is used for affecting the joint extension and flexion thereby enabling reeducation and restoration of the physical function of the at least one neuromuscular system.

21. The system according to claim 16, wherein the at least one force sensor is a force sensitive resistor.

22. The system according to claim 16, wherein the continuous passive device is an air-muscle device.

23. A system for neuromuscular function reeducation and restoring physical function of an at least one neuromuscular system associated with an at least one joint in a patient, the system comprising:

a continuous passive machine including an air-muscle device for allowing the extension and flexion of the joint in the patient;

wherein the continuous passive device enables reeducation and restoration of the physical function of the neuromuscular system in the patient through the at least one of a visual, aural, and tactile feedback of the measured parameters obtained from the patient.

24. The system according to claim 23, wherein the air-muscle device is inflatable.

25. The system according to claim 24, wherein the air-muscle device shortens in length upon inflation thereby causing the joint to pivot about at least one axis.

26. The system according to claim 23, wherein the measured parameters include at least one EMG signal associated with an agonist muscle in the neuromuscular system.

27. The system according to claim 23, wherein the measured parameters include at least one parameter indicative of resistance of at least one antagonist resisting muscle in the neuromuscular system.

28. The system according to claim 23, wherein the visual feedback is provided through at least one LED.

29. A system for neuromuscular function reeducation and restoring physical function of at least one neuromuscular system associated with an at least one joint in a patient, the system comprising:

a motion causing device adjacent to the at least one joint, said motion causing device permitting self-actuation of the at least one neuromuscular system;

at least one force sensor for measuring a parameter indicative of muscle resistance;

at least one joint position sensor for measuring joint movement;

at least one neuromuscular electrical stimulating (NMES) system for providing neuromuscular stimulation to the at least one neuromuscular system;

an electronic memory system that stores information of the patient;

at least one EMG sensor measuring the electrical activity of said at least one neuromuscular system; and

a controller implementing a protocol for affecting the joint motion based on the measurements from the sensors thereby restoring physical function of said neuromuscular system associated with the at least one joint.

30. The system according to claim 29, wherein the stored information in the electronic memory system includes patient compliance and patient performance.

31. The system according to claim 29, wherein the electronic memory system can provide the stored information of the patient on command.

32. The system according to claim 29, wherein the at least one EMG sensor is used for measuring the electrical activity of an agonist neuromuscular system.

33. The system according to claim 29, wherein the motion causing device is an air-muscle.

34. The system according to claim 32, wherein the at least one force sensor is used for measuring a force signal from an antagonist resisting neuromuscular system.

35. The system according to claim 29, wherein the at least one force sensor is a force sensitive resistor.

36. The system according to claim 33, wherein the air-muscle includes at least one port for supplying pressurized air to inflate said air-muscle.

37. The system according to claim 36, wherein the air-muscle shortens in length upon inflation thereby causing the joint to pivot about at least one axis.

38. The system according to claim 29, wherein the joint is a wrist joint.

39. The system according to claim 29, wherein the joint position sensor and the force sensor provide a measure of combined wrist and finger flexor muscle resistance.

40. The system according to claim 30, further including a first display for depicting the electrical activity from the EMG sensor.

41. The system according to claim 40, further including a second display indicating a degree of flexor resistance torque measured by the at least one force sensor.

42. The system according to claim 41, wherein the displays provide a means for the patient to monitor the compliance and performance.

43. The system according to claim 42, wherein the controller updates the displays in a predetermined manner to provide a mechanism for the patient to improve said performance and said compliance.

44. The system according to claim 36, wherein the controller includes a microprocessor for controlling at least one valve for controlling the supply of pressurized air to the air-muscle.

45. A system for providing movement to at least one joint for restoring physical function of at least one neuromuscular system associated with the joint, the device comprising:

at least one inflatable device adjacent to said at least one joint and each device having two ends, wherein one end is connected to a distal element of the joint and the other end to a proximal element of the joint;

a source for supplying pressurized air to the inflatable device;

wherein the inflatable device shortens in length upon inflation thereby causing said at least one joint to pivot about at least one axis.

46. The system according claim 45, wherein the at least one inflatable device is an air-muscle.

47. The system according to claim 45, wherein the supply of pressurized air to the inflatable device is controlled by a controller.

48. The system according to claim 47, further including at least one force sensor for measuring a parameter indicative of muscle resistance.

49. The system according to claim 48, further including at least one joint position sensor for measuring joint movement.

50. The system according to claim 49, further including at least one EMG sensor for measuring the electrical activity of said at least one neuromuscular system.

51. The system according to claim 50, further including at least one neuromuscular electrical stimulating (NMES) system.

52. The system according to claim 51, wherein the controller implements a protocol for affecting the at least one joint motion based on the measurements from the sensors thereby restoring physical function of said neuromuscular system associated with the joint.

53. A method implementing a protocol for restoring physical function of at least one neuromuscular system associated with a joint in a patient, the method comprising:

measuring a first signal indicative of the activity of said muscle through an EMG sensor;

measuring a second signal indicative of the joint motion through a joint position sensor;

measuring a third signal indicative of the muscle resistance through a force sensor;

mapping the measured signals to at least one parameter; and

controlling the air level in an inflatable device in order to optimize said parameter for restoring physical function of said muscle associated with the joint in the patient, the inflatable device being adjacent to the joint and being inflated or deflated through at least one port associated with the device.

54. The method according to claim 53, further including storing information in an electronic memory system, said information including patient compliance and patient performance.

55. The method according to claim 54, further providing the stored information from the electronic memory system to the patient on demand.

56. The method according to claim 53, wherein the EMG sensor is used for measuring the electrical activity of an agonist resisting neuromuscular system.

57. The method according to claim 53, wherein the force sensor is used for measuring the force signal from an antagonist resisting neuromuscular system.

58. The method according to claim 53, wherein the force sensor is a force sensitive resistor.

59. The method according to claim 54, further including the step of displaying the electrical activity from the EMG sensor to the patient through a first display.

60. The method according to claim 59, further including the step of displaying a degree of flexor resistance torque measured by the force sensor through a second display.

61. The method according to claim 60, wherein the displays provide a means for the patient to monitor the compliance and performance.

62. The method according to claim 61, further including the step of updating the displays to provide a mechanism for the patient to improve said performance and said compliance.

63. The method according to claim 53, further providing a stimulation through at least one neuromuscular stimulating electrode to the neuromuscular system.

64. A method implementing a protocol for restoring physical function of at least one neuromuscular system associated with a joint in a patient, the method comprising:

measuring a first signal indicative of antagonist muscle resistance through a force sensor in the neuromuscular system of the patient;

wherein the signal from the antagonist resisting muscle is used to provide sensory feedback for affecting the joint extension and flexion, through the patient's cognitive action, thereby enabling reeducation and restoration of the physical function of the at least one neuromuscular system.

65. The method according to claim 64, further including measuring a second signal indicative of the joint motion through a joint position sensor.

66. The method according to claim 64, further including measuring an electrical signal associated with an agonist muscle in the neuromuscular system of the patient.

67. The method according to claim 64, further including providing a stimulation through at least one neuromuscular stimulating electrode to the neuromuscular system.

68. The method according to claim 66, further including mapping the measured signals to at least one parameter for optimization.